

Low-Voltage E-Stop Safety Relay



Product Profile

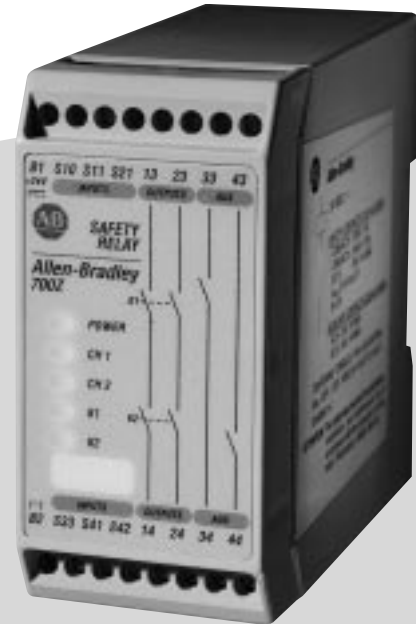
Today's machine safety requirements are stricter and more complicated than ever. Shaped by requirements such as the European Union Machinery Directive, OSHA, and ANSI, safety regulations and standards continue to raise the bar on the level of acceptability. That's why, regardless of the industry, machine builders are increasingly assessing levels of risk and implementing safety related devices to guard against safety hazards.

EN 954 (Safety of Machinery—Safety-related parts of control systems) and EN 1050 (Safety of Machinery—Principles for risk assessment) give guidelines for assessing operator hazards, and help classify risk category. Safety relays play a critical role in meeting category 4 safety requirements and are also used for category 2/3 (EN 954).

Benefits

Designed to meet requirements of the strictest standards, these safety relays contain positive-guided relays, interconnected according to a redundant and self-checking circuit. Even if a fault occurs in the input devices or relay contacts, the relay is designed so that the safety function is performed, increasing operator and machine safety. A Bulletin 700Z relay can be de-energized even if a relay contact welds, or if there is a fault in the E-stop, gate interlock, reset button, expander unit, or auxiliary relays. Other benefits include:

- Flexibility in wiring (category 2 or 4), for use in a variety of safety circuits
- Simplified installation with clearly marked terminals and easy-to-read label
- Variety of connection schemes to fit a variety of applications
- Enhanced LED diagnostics to locate faults, and troubleshooting guide for quick determination of problems
- Additional monitored outputs and higher current applications can be connected – feedback loop for status monitoring of expander units and/or auxiliary relays.



Features

The Allen-Bradley Bulletin 700Z Safety Relay (Cat. Nr. 700-ZBL220Z24) is designed to meet requirements for categories 2 or 4 (EN 954) in a 45mm wide, DIN rail mountable box. This 24VDC unit has a redundant self-monitoring internal circuit with positive-guided internal relays. Other features include:

- Two monitored safety relay outputs (N.O.) to meet redundancy requirements
- Two auxiliary contacts (N.O.) for signaling to a PLC or indicating device
- Five diagnostic LEDs
- Additional outputs available with expander units and/or auxiliary relays.
- Internal, resettable electronic fuse

Applications

- Emergency Stop (E-Stop)
- Gate Interlock

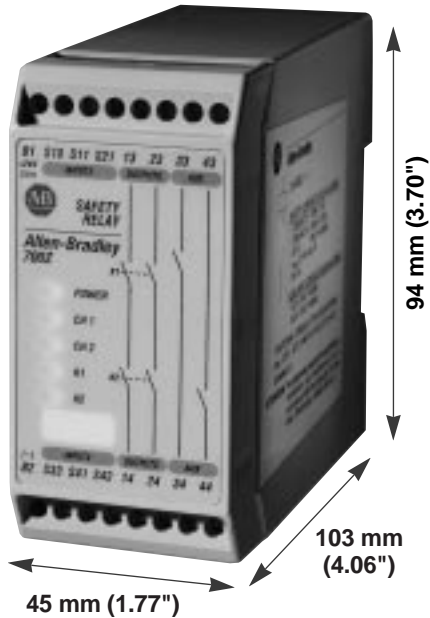


Conforms to: EN 60204, EN 292, EN 954-1, EN 947-5-1 UL 508, CSA C22.2 No. 14

Rockwell
Automation

Construction

The Bulletin 700Z is constructed with single rows of terminals to simplify field wiring.



Power Terminals (24VDC)	+B1 and -B2
Input Terminals (See Figures 1 and 3)	
E-Stop, Gate Interlock. Channel 1:	S10 and S11
. Channel 2:	S21 and B2
Start Button	S10 and S33
Safety Output Terminals.	13-14, 23-24
(monitored outputs, voltage free)	
Auxiliary Terminals K1 Auxiliary:	33-34
. K2 Auxiliary:	43-44

Applications

This table includes wiring symbols and operator interface catalog numbers for the applications that follow.

	S2 Emergency Stop Dual channel EN 60617-7, EN 418	800T-FXT6A5 800H-FRXT6A5 800EM-MTS443LX02 800EP-MTS443LX02
	S4 Emergency Stop Single channel EN 60617-7, EN 418	800T-FXT6D4 800H-FRXT6D4 800EM-MTS443LX01 800EP-MTS443LX01
	S1 Reset	800T-A1A 800H-BR1A 800EM-F33LX11 800EP-F33LX11
	S3 Gate Interlock EN 1088	802F-** See Pub. 802SS-1.0 or C-112, Chapter 3
	Positive operation EN 60617-7	Contacts are forced open mechanically
	Force guided contacts EN 60947-5 EN 50205	If N.O. welds all N.C. contacts cannot close
	Mechanically linked EN 60617-2	Contact set travels together

Emergency Stop

A Bulletin 700Z Safety Relay (Cat. Nr. 700-ZBL220Z24) can be wired for category 2 or 4, and in conjunction with a gate interlock.

Dual Channel E-Stop is suitable up to EN 954 category 4. Configuration requirements include:

- Use an E-Stop button conforming to EN 418. It must have two normally closed (N.C.) contact blocks that conform to EN 60947-5-1 positive-opening operation.
- Use a start/reset momentary push button with one normally open (N.O.) contact block.

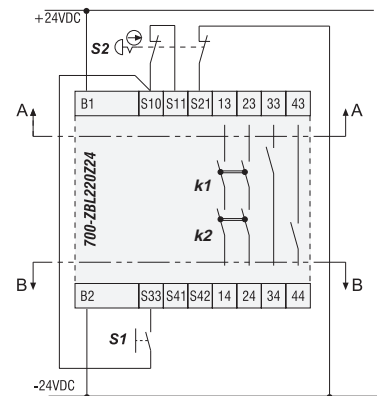


Figure 1

Single Channel E-Stop is suitable up to EN 954 category 2.

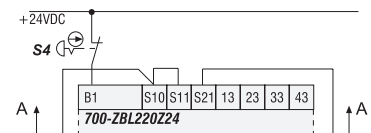


Figure 2

(Refer to Figure 1 above for complete wiring.)

Gate Interlock

Suitable up to EN 954 category 4.

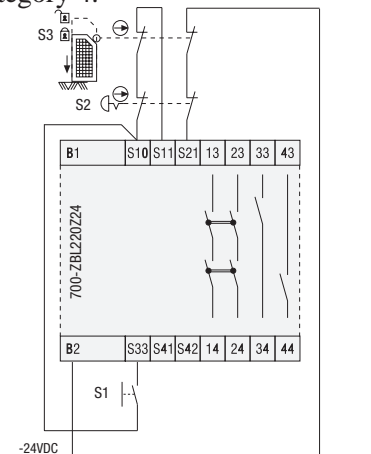


Figure 3

(Refer to Figure 1 above for complete wiring.)

Expander Units

Suitable up to category 4, expander units can be used with E-stop and gate interlock. They are available in two widths:

- 90 mm having eight monitored outputs, one auxiliary (catalog number 700-ZBE810AZI)
- 45 mm having three monitored outputs (catalog number 700-ZBE300AZ1)

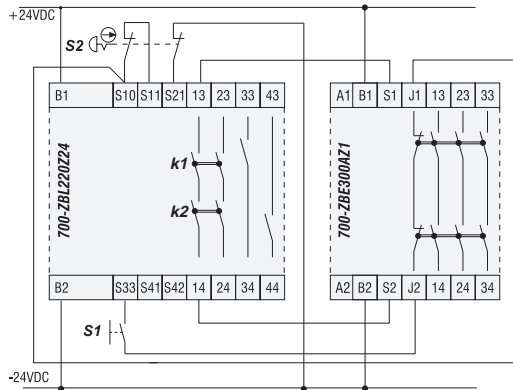


Figure 4

Auxiliary Relays

Suitable up to category 4.

- These relays must conform to EN 50205 with positive-guided/Direct Drive™ style.
- The auxiliary relays must be monitored by connecting N.C. contacts in series to the reset circuit.

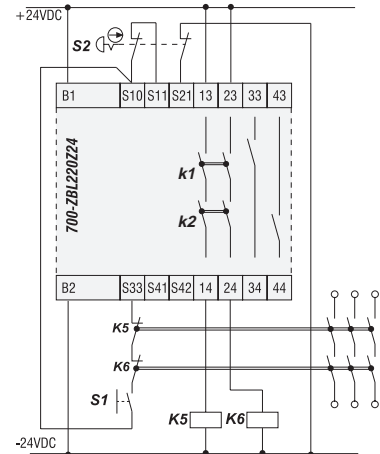


Figure 5

Automatic Start



ATTENTION: Unexpected/unintended start-up may occur after power supply interruption. Autostart is not allowed for E-stops per EN 292-2, 954-1, 60204-1, 418.

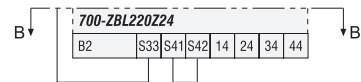


Figure 6

(Refer to Figure 1 on page 2 for complete wiring.)

Diagnostics and Trouble Shooting

Run and Fault Conditions applying to Figures 1, 3, 4, and 5.

POWER LED	STOP RESET						STOP ACTUATED			
	●	○	●	●	○	○	○	●	●	●
CH 1 LED	●	○	●	●	●	●	○	○	●	○
CH 2 LED	●	●	○	●	●	●	○	○	○	●
K1 LED	●	○	○	●	○	○	○	○	○	●
K2 LED	●	○	○	○	●	○	○	○	●	○
CONDITION	proper running conditions	channel 1 contacts may be open	channel 2 contacts may be open	start/reset actuator contacts may be welded.	safety contacts may be welded	● waiting for start/reset signal ● expander or aux. contacts may be welded.	input short or no power	input circuit is open	channel 1 contacts may be welded	channel 2 contacts may be welded
ACTION	none	replace channel 1 contact block	replace channel 2 contact block	replace safety reset contacts	replace safety relay	replace expander or aux. relay	after clearing short, power must be off 20 sec. to reset fuse	reset E-stop or gate	replace channel 1 contact block	replace channel 2 contact block

Specifications

Safety Relay Cat. No. 700-ZBL220Z24

Conforms to: EN 60204, EN 292, EN 954-1, EN 947-5-1, UL 508, CSA C22.2 No. 14

Electrical Ratings		
Supply voltage, IEC 38	DC: 24V, -20% +10%	
Maximum Supply Voltage Interruption	20 ms	
Ripple	DC: 10%	
Nominal Input Power Consumption	2.6W	
Internal Control Voltage	24 VDC	
Inrush/Sealed Current	4A/110mA	
Number of Safety Circuits	2	
Safety Contact Maximum Voltage	1 ~50/60Hz 240V; DC 24V	
Safety Contact Maximum Free Air Thermal Current (I_{th})	5A, AC/DC	
Safety Contact Rating Designation (inductive) (IEC 947-5-1)	C300 AC-15 120V, 1.5A C300 AC-15 240V, 0.75A	DC-13 24V, 2A DC-12 24V, 5A
Safety Contact Rating Designation (non-inductive) (IEC 947-1-1)	AC-1 240V, 5A, 1200VA	DC-1 24V, 5A, 120W
Safety Contact Minimum Load NOTE: Exceeding 48V may remove gold flash and thus affect minimum load performance	24VAC/DC, 20mA	
Number of Auxiliary (Data) Circuits	2	
Auxiliary Contact Maximum Voltage	50/60Hz 24V; DC 24V	
Auxiliary Contact Rating Designation (inductive) (IEC 947-5-1)	AC-15 24V, 1A MAX.	DC-13 24V, 1A MAX.
Auxiliary Contact Rating Designation (non-inductive)	AC-1 24V, 1A, 24VA	DC-1 24V, 1A, 24W
Auxiliary Contact Minimum Load	5VDC, 10mA	
Pick Up (Start/Reset Button)	13ms	
Drop Out (E-Stop Button)	13ms	
Wire Gauge	0.2-2, 5mm ² (24-14 AWG)	
Terminal Capacity	One wire 1 X 2.5mm ² Two wires 2 X 1.5mm ²	1 X 14 AWG 2 X 16 AWG
Output Protection Fuse Needed	5A Quick-Blow (F) (Non-inductive) 1.6A Slow-Blow (T) (Inductive)	
Electronic Fuse Reset Time	20 sec	
Rated Impulse Withstand Voltage (U_{imp})	Overvoltage cat.III/2,5 kV – Class I Equipment	
Rated Insulation Voltage (U_i)	300V	
Maximum Distance to E-Stop Plus Start/Reset Using 1.5mm ² (16 AWG) Stranded Copper With Wire Resistance of 17.36 Ω /km (5.29 Ω /1000ft.)	860m (2,800ft.)	
Environmental		
Operating Temperature Ambient	-25° C to 55° C (-13° F to 131° F)	
Humidity, Non Condensing	95% RH	
Storage Temperature	-30° C to 85° C (-22° F to 185° F)	
Mounting Method, EN 50022	On 35mm DIN Rail	
Permitted Mounting Position	Any	
Terminal Protection, IEC 529	IP2X	
Housing Protection, IEC 529	IP40	
Vibration	10-200Hz, 5G	
Shock/Bump, IEC 68-2-24	11ms, 10G/16ms, 10G	
Insulation Coordination	Degree of Pollution 2	
Mechanical Operations	>1 X 10 ⁷ Switching Operations	
Construction		
Housing Material	Polyester PBT (UL 94V-0)	
Safety Contact Material	AgSnO ₂ + Gold Flash	
Auxiliary Contact Material	Ag Alloy	
Weight	225 Grams	
Width	45mm (1.77 in.)	
Height	94mm (3.70 in.)	
Depth	103mm (4.06 in.)	

Reach us now at www.rockwellautomation.com

Wherever you need us, Rockwell Automation brings together leading brands in industrial automation including Allen-Bradley controls, Reliance Electric power transmission products, Dodge mechanical power transmission components, and Rockwell Software. Rockwell Automation's unique, flexible approach to helping customers achieve a competitive advantage is supported by thousands of authorized partners, distributors and system integrators around the world.



Americas Headquarters, 1201 South Second Street, Milwaukee, WI 53204, USA, Tel: (1) 414 382-2000, Fax: (1) 414 382-4444
European Headquarters SA/NV, avenue Herrmann Debroux, 46, 1160 Brussels, Belgium, Tel: (32) 2 663 06 00, Fax: (32) 2 663 06 40
Asia Pacific Headquarters, 27/F Citicorp Centre, 18 Whitfield Road, Causeway Bay, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846
 Publication 700Z-1.2EN — August 1998



Rockwell Automation

Copyright 1998 Rockwell Automation.